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Human Health, the Nutritional Quality of Harvested Food and Sustainable Farming Systems

by
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The alarming fact is that foods – fruits, vegetables and grains – now being raised on millions of acres of land that no longer contains enough of certain needed nutrients,are starving us -- no matter how much we eat of them.

U S Senate Document 264 1936

Introduction

In the United States and throughout the world much of the world's inventory of arable topsoil has been lost due to erosion, overuse of inorganic nitrogen fertilizers, and other farming practices that leave the soil depleted. The depletion of soil nutrients and soil microorganisms contributes to soil erosion and the loss of arable topsoil. The Earth is losing arable topsoil at a rate of 75 to 100 GT. per year. If soil loss continues at present rates, it is estimated that there is only another 48 years of topsoil left.

In the United States soil is eroding at a rate that is ten times faster than the rate at which it is being replenished. The rate of soil erosion is much faster in other parts of the world such as Africa, India and China where erosion rates are 30 to 40 times faster than the rate of replenishment. In areas of Africa the combination of soil depletion and soil erosion has lead to the prediction of plummeting crop yields.

Food grown in nutrient deficient soil lacks the nutrients needed to keep people healthy. Studies reveal that the nutritional values in food have declined significantly over the past 70 years. The declines in the nutritional values in food have been attributed to mineral depletion of the soil, loss of soil microorganisms along with changes in plant varieties.

Without adequate nutrition from food, we become susceptible to disease. Simply stated … a lack of nutrients leads to malnutrition … malnutrition leads to disease. Wellness stems from eating nutrient rich, flavorful food. A critical need exists to provide assurance of the nutritional values in the food we eat.

The Nutrition Security Institute aims to reverse this tragedy, replenish the nutritional values in topsoil and increase the nutritional values of harvested food. NSI will work to ensure that the nutritional quality of harvested food is adequate to sustain human health. NSI programs will restore the critical minerals and organic material in depleted soils and encourage the production of nutrient dense food.

We will work to facilitate the transfer of new organic soil science technology to halt the loss of topsoil, restore soil health and the soil's ability to produce nutrient dense food. NSI will foster advanced technology, sustainable, organic farming systems to maintain needed nutrients and the biological life in soils to produce nourishing food with high nutrient levels.

Human Health

The human body needs nutritious food to stay healthy. Food is the body's main source of energy. The nutrients in food are needed to maintain life. Our diet, the food we eat, is our source of nutrients for all the body's biochemical processes. The essential nutrients come from plants – fruit, vegetables, grains, legumes, nuts, seeds and animals – diary food, eggs and meat.

To maintain good health, we need both macronutrients - carbohydrates, proteins, and fats and micronutrients – vitamins and minerals. Macronutrients are our main source of energy. Vitamins and minerals are essential for the body's many biochemical processes. Both vitamins and minerals are needed to maintain optimal health. Vitamins are organic compounds found in plants and animals. We obtain them by eating food from plants and animals. Minerals are inorganic compounds found in the earth. Minerals assist the body in energy production and other biochemical processes.

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MINERALS GO DOWN, DISEASE GOES UP

Changes in the Rates of Selected Reported Chronic Diseases, 1980-1994

(per 100,000 member of the US Population)

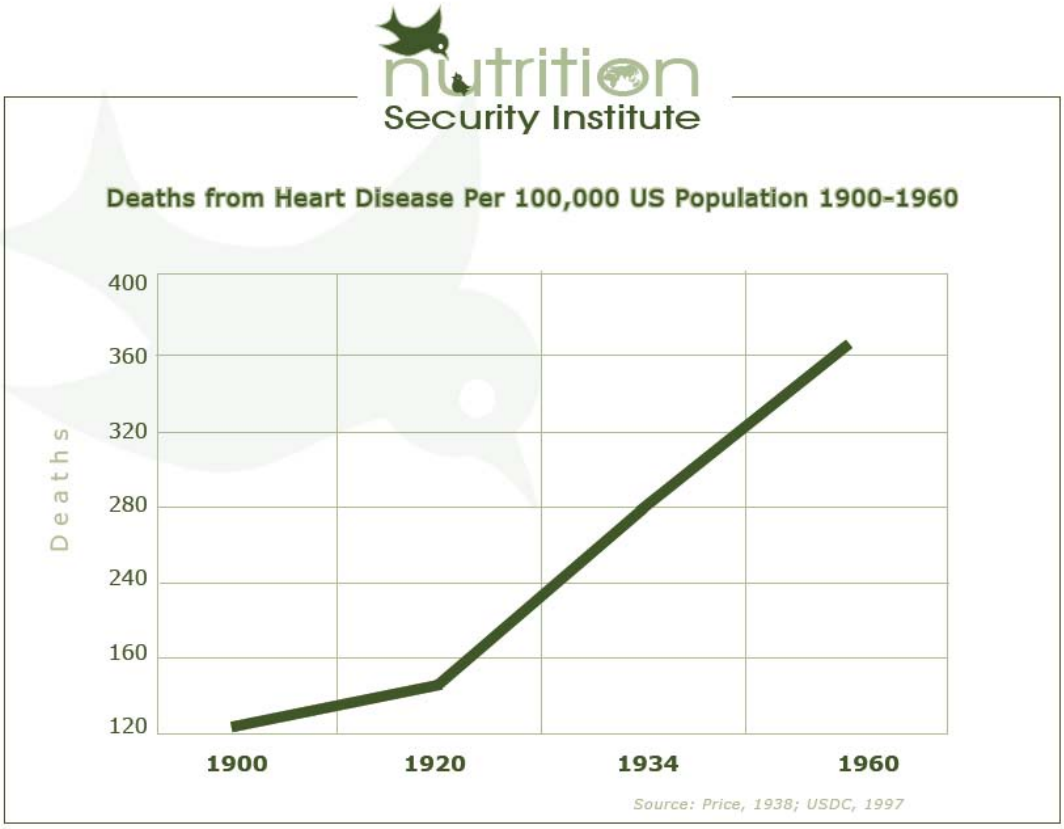
Mineral	1980	1994	%Increase	Minerals Deficiencies Associates with Disease
Heart Conditions	75.40	89.47	18.67	Chromium, Copper, Magnesium, Potassium, Selenium
Chronic Bronchitis	36.10	56.30	55.98	Copper, Iodine, Iron, Magnesium, Selenium, Zinc
Asthma	31.20	58.48	87.44	Magnesium
Tinnitus	22.60	28.24	24.98	Calcium, Magnesium, Zinc
Bone Deformities	84.90	124.70	46.96	Calcium, Copper, Fluoride, Manesium

Source: USDC, 1996, Werbach, 1993

Nutritional research has revealed the critical interrelationship between minerals and optimum human health. There are seventeen known essential minerals and many other trace minerals that are all needed for good health. Minerals interact with each other in many of the body's critical metabolic functions. Minerals may be more vital to physical and mental health than vitamins. The full spectrum of essential minerals is critically important to the maintenance of human health. Because the human body cannot manufacture minerals, deficiencies are common.

According to the US Department of Agriculture (USDA), Americans typically lack a sufficient amount of the minerals calcium, magnesium, potassium and the vitamins A, C, D and E needed to maintain good health. As an example, calcium is essential for the formation of blood clots, the transmission of nerve impulses, as a metabolic cofactor to release energy from macronutrients, for maintaining a rhythmic heart rate and controlling concentrations of substances on differing sides of cell membranes throughout the body. Mild calcium deficiencies can cause heart palpitations, insomnia, irritability, nerve sensitivity, muscle twitching, mental confusion and a feeling of depression. Serious calcium deficiencies can lead to bone loss, a common health problem. Other mineral deficiencies lead to a host of well documented health problems..

Without adequate nutrition, especially minerals, research has shown that people develop chronic health conditions. More and more nutritional studies have linked many of today's most prevalent, life threatening chromic diseases – diabetes, heart disease, stroke, obesity, high blood pressure, macular degeneration, bone loss, dementia to nutritional deficiencies. Research is finding simple nutrition may eradicate many of these common conditions as it has with scurvy, pellagra, beriberi and others. The simple truth may be that susceptibility to disease is linked to either toxicity or nutritional deficiency. Increasingly, scientific research has shown that the secret to life-long health is good nutrition.



The Nutritional Quality of Harvested Foods

The nutrient values of harvested food are linked to soil organic matter, the biological activity of soil microbes, the mineral composition of the soil as well as the genetics of the plant, fertilization and irrigation practices. Minerals are an essential aspect of soil and critical to the healthy microbial life in the soil. Without minerals, soil loses the ability to support the growth of nutritious food. Soils without minerals cannot produce plants with minerals. Foods grown on soils depleted of minerals do not contain the minerals need to maintain human health.

Recent studies that compared the mineral content of soils today with soils 100 years ago found that agricultural soils in the United States have been depleted of eight-five percent of their minerals (Rio Earth Summit 1992.) This phenomenon was documented worldwide. Researchers found that soils in Africa have seventy-four percent less minerals, soils in Asia have seventy-six percent less minerals, soils in Europe have seventy-two percent less minerals, soils in South America have seventy-six percent less minerals and in Canada soils have eight-five percent less minerals than 100 years ago.

Without minerals and soil organic matter it is impossible to sustain a healthy population of microorganisms which are directly responsible for producing vital bio-chemicals which are the basis for the nutrition values of plants. Crops grown in soils stripped of needed nutrients have low nutrient levels. Unless growers replenish nutrients, the mineral content of harvested food will continue to decrease.

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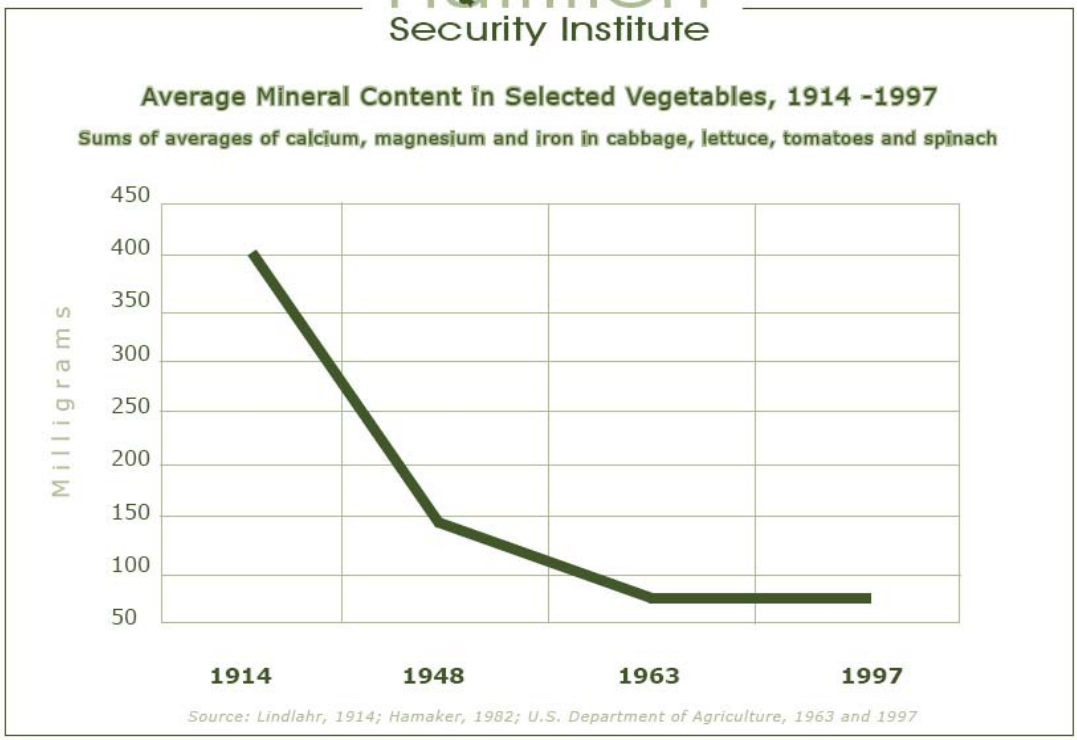

In addition to minerals, a biologically alive soil requires organic content. Carbon in our soil is critically important to the survival of the microbial food web that exists in a living soil. The organic content of the soil is decomposition of organic matter into the soil. Decomposing organic material increases carbon content to the soil. This is accomplished by the decomposing material entering the soil as a tea where bacteria and fungi render it into a soil acid gel. These gels are responsible for holding moisture content in the soil. They can hold up to 98% of their weight as added moisture. They allow air to enter the soil while protecting the soil from destructive rainfall and erosion.

The decline in the nutritional quality of food has been linked to production methods that result in soil degradation or the "mining" of soil fertility. Globally, the Green Revolution of the past 50 years has resulted in the use of large amounts of petroleum based, synthetic fertilizers to increase productivity. To increase yields, a vast over-application of inorganic, synthetic nitrogen has been applied to farmland. This over-application of labile, inorganic nitrogen stimulated the soil microbes and resulted in the destruction of the natural balance of carbon reserves in the soil.

With the destruction of moisture holding carbon, soils have lost the ability to grow healthy plants and to hold moisture. Along with losing the ability to hold nutrients, the bio-availability of minerals for plant growth has been significantly decreased as a result of the accelerated withdrawal of minerals from the soil without corresponding additions.

Sustainable Farming Systems and Nutrient Dense Food

Much of our agricultural soils have been exhausted of the minerals and organic material needed to grow nutritious food. Exhausted soils depleted of critical minerals cannot grow healthy, nutrient rich crops. Crops require minerals and organic materials to transform nutrients into forms that plants can use for growth. Food grown in nutrient deficient soil lacks the nutrients needed to keep people health.

The nutritional content of harvested food produced today is significantly different from the food produced 70 years ago. Comparative analysis of the USDA's food composition tables have consistently shown that the nutritional value of harvested food has declined. The net result is that the food we consume has lost the nutrients we need for good health values in food over the past several decades. Most vegetables and fruits have lost substantial vitamin and mineral content during the last forty years. Our food system is rapidly losing its ability to produce food with nutrient levels sufficient to maintain health.

Studies have shown that nutrient dense food is generally superior to low nutrition food in appearance, taste and texture. Nutrient dense food provides a higher level of sweetness and natural flavors that makes it easily discernable, when tested, from food with lower levels of nutrients. Nutrient dense food generally has a superior appearance to lower nutrition food. Its texture and weight is superior, its shelf life and ability to withstand shipping stress is superior, it is less susceptible to mold and fungus and more resistant to insects.

However, USDA standards are limited to size, shape and color. None of the current USDA standards address nutritional values. Organic industry standards address production methods that reduce toxicity and avoid the use of chemical fertilizers and pesticides. Neither the USDA nor the organic industry standards address the nutritional quality of food.

The nutritional value of harvested food is becoming a major issue. Due to the mineral depletion of our soils and the loss of organic content, the nutrient density of harvested foods has declined in the U S over the past 100 years. At the same time, food consumers are becoming increasingly sophisticated, interested in wellness and the prevention of disease. With this increased awareness they are seeking high quality, organic produce.

It is an indisputable fact that healthy soils are responsible for the production of food borne antibiotics, vitamins, phytochemicals, and amino acids. All of these nutrients are vital to the health of humans. Agriculture practices must rise to meet the challenges of new demands for plant-borne vitamins, minerals and incorporated phyto-chemicals to keep people healthy. For agriculture to meet these demands, a program of economic incentive is needed that creates marketplace recognition for the additional value of these invisible benefits.

How does a grower set about to grow high nutrition food? Organic production and soil management methods exist to reduce toxicity and reverse the low nutrient content of depleted agricultural soils. Additional inputs, in the form of mineral nutrients and enhanced organic matter are needed to produce foods with high nutritional values. In organic soils, these additional nutrients are necessary to create high quality biologically alive soil.

In biologically alive soils, all groups of microscopic organisms must receive all the required complex forms of nutrients needed to survive and thrive. These complex nutrients are carbon based elements that exist in ionic forms in the soil. It is the replacement of these nutrients taken from the soil by previous crops that allows soils to be sustained indefinitely while producing very high grade nutrition dense foods. These proven methods produce flavorful, nutrient rich food.

High nutrition foods require a growing medium that contains all the elements that enable a food crop to grow to its maximum genetic potential. A biologically alive soil that is balanced in its mineral values and carbon content is necessary. In addition to minerals and organic material, an understanding of the mechanisms of the soil that allow and accelerate the restoration and maintenance of soil is needed. Mineral elements in the soil along with the organic elements that enable the soil to be restored must be replaced when depleted. Then, and only then, can this class of crops be grown.

Many growers manage their soil with great skill and care for its health and long term productivity. The result of the farming practices of these exemplary farmers is the production of food crops of exceptional taste and high nutritional values. A grower who works to increase crop nutritional values rarely receives a financial reward for doing so. The present marketplace has no mechanism for rewarding growers for improved taste and increased nutritional values in fruits and vegetables.

Conclusion

Our food system is rapidly losing its ability to produce food with nutrient levels adequate to maintain the health of our families. There is no guarantee that the food produced and harvested meets nutritional standards needed to maintain good health. To change this threat to the health of our families and the families of the world an effective strategy to increase the nutritional values of our food and restore the minerals and organic material in our depleted our soils is needed.

The Nutrition Security Institute (NSI) aims to restore depleted soils, regenerate topsoil and assure that arable soils will grow the nutritionally rich food needed to keep people healthy. Specific goals of the Nutrition Security Institute are to:

- Establish comprehensive programs to restore minerals and organic content to soils to halt declines in topsoil
- Encourage the application of new soil science to change agricultural practices to improve the biological life in soil
- Improve human health by promoting agricultural methods that increase the nutritional values of food

To work toward meeting these goals, NSI is developing three program areas, Global Topsoil Restoration Initiative, Sustainable Soils Initiative and Nutrient Dense Food Initiative. These three program areas will provide global leadership to implement a global vision of a global food systems where sustainable farms grow nourishing food for people in healthy nutrient rich biologically active soils.

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